

# Work Order ID 60822

Friday, July 23, 2010 10:28:50 AM



Page 1

Item ID: D350-748-201

Accept



Setup Start



Revision ID:

Item Name: Crosstube Installation, High Aft

Stop



Start Date: 7/23/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 8/16/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

*[Signature]*

Date: 10-7-23

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
D350-748-241	Rev E

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-201

CHG001

*8/10/07/20*

*10-7-23*

110

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and

Folio FT *D350 748-201*

*(X)*

*Q*

*MR 10-08-17*

120

QC15- Crosstube Dimensional Check

0.00



QC

Memo

0.00

Quality Control

*1*

*100818*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

130



Crosstubes

Crosstubes

Memo

0.00

1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,  
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube

Batch: 109956

140



QC

Quality Control

QC6- Inspect dimensions to drawing

0.00

Memo

0.00

8/10/2010



Pb →

MB 10-08-18

AWM 10-05-18

Dart Aerospace Ltd

W/O: 60822		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
10/6/19	# 110.5	ADD step to stress relief (steel) per AS7 010 bels step # 120	A	10-09-21		1/100519	S 10/6/19	
10/6/19	# 110.5	stress relief per AS7 010 temp 325°F start time 1130 AM End time 330 PM	DP	10-8-17		1/100519	S 10/6/19	

Part No: D350-748-201 PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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4.2.3.12 Slide mandrel on top of both V-blocks and through bracket.

4.2.3.13 Tighten both nuts in an equal manner so that there is no play/movement in the mandrel.

4.2.3.14 Place buggy in proper orientation per bender folio.

### REFERENCE ONLY

#### 4.3 CROSSTUBE STRESS RELIEF ( STEEL)

4.3.1 Stress relief shall be performed as soon as possible after bending:

4.3.1.1 Place Crosstubes in the oven vertically (as installed on the aircraft)

4.3.1.2 Heat crosstubes at 375 deg F for 4 hours

4.3.1.3 Allow to cool at room temperature

#### 4.4 DT8577A TABLE SETUP FOR ASSEMBLY

4.4.1 Remove all bolts (2 per support) in both support stands.

4.4.2 Remove both support stands from previous location and place in proper hole location using the hole location chart for DT8577A.

4.4.3 Ensure cuff supports provide stability for crosstube during assembly in proper hole location.

4.4.4 Tighten all bolts (2 per support).

4.4.5 Make sure that painted supports are used for Support/Abrasion Strip installation.

4.4.6 Use proper support locating jigs for correct crosstubes. Check with blueprints for correct angles needed.

4.4.7 Use correct Abrasion strip locating tools for correct crosstubes.

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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150 	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
Outsource3	<b>Memo</b>	0.00							
Outsource process - Cad plate	Issue P/O: <u>12345</u> Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								<u>CZ 10/8/17</u> <u>①</u>
160 	Receive & Inspect for Damage & Mat'l Certs	0.00							
Packaging	<b>Memo</b>	0.00							
Packaging	Ensure certificate of conformity is attached								<u>10/8/17</u> <u>①</u>
170 	QC5- Inspect part completeness to step on W/O	0.00							
QC	<b>Memo</b>	0.00							
Quality Control									<u>ml 10 09 15</u> <u>①</u>

PTO

Dart Aerospace Ltd

W/O: 60822		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
10/9/14	175	ODT per QSI 038 before + after load testing per eng. this time only P/O: <u>12537</u>	CZ	10/9/14	①	U 12.9.13	S 10/9/14
		read + inspect	C	10/9/14	①		S 10/9/14

Part No: D350-748-201 PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180 	SprayPaint	0.00				<i>ml</i>	<i>0</i>	<i>09</i>	<i>15 (1)</i>
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 2-Paint Outside of Tube as per Dart QSI 005 4.2								
190 	QC14- Inspect Spray Paint	0.00							
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200 	Crosstubes	0.00							
Crosstubes	Memo	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer 2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS								

*ET 10-09-16**ml 10 09 16 (1)*



# Dart Aerospace Ltd

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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Customer:

Reference:

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Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00

S 10/09/10



QC

Memo

0.00

Quality Control



220

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

10/9/10 SEP

230

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

S 10/09/10



W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPPD350-748-201								
	Location: <u>104</u>								
	PPP Rev: <u>A</u>								
250									
	QC21- Final Inspection - Work Order Release	0.00							
QC	Memo	0.00							
Quality Control									

10/9/2010

10/9/21/10

mf  
10-9-21

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 1

Work Order ID: 60822

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft





Start Date: 7/23/2010

Required Date: 8/16/2010

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM  
IPP Rev: B Update qty of MS21042L5 06-09-12 KJ  
IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD  
IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC  
IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-241TRN 		Manufactured	No	B59550		110	Each	0.0000	1	1		DP 10-8-17	
Crosstube Turning Detail													
ALS4-1032-225 		Purchased	No			200	Each	6,043.000	1	1		ml 10-09-16	
Insert													
<div> <div>Location</div> <div>PK011</div> <div>110768</div> </div> <div> <div>Loc Qty</div> <div>6043</div> <div>6043</div> </div> <div> <div>Loc Code</div> <div></div> <div></div> </div>													
AN960JD10 	NAS1149D0363J	Purchased	No	B# 105792		200	Each	0.0000	1	1		ml 10-09-16	
Washer													
D2856-400 		Manufactured	No			200	f	361.0188	1.181	1.243158		ml 10-09-16	
Abraison Strip													
<div> <div>Location</div> <div>ST403</div> <div>56626</div> <div>59920</div> </div> <div> <div>Loc Qty</div> <div>361.0188421</div> <div>145.018842</div> <div>216</div> </div> <div> <div>Loc Code</div> <div></div> <div></div> <div></div> </div>													

1- cut as per dwg D2856

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Start Date: 7/23/2010

Required Date: 8/16/2010

Start Qty: 1.00

Required Qty: 1.00

D3502-1 Manufactured No

200 Each

56.0000

2

2



Support



*MA 10.08.16*

Location

Loc Qty

Loc Code

ST066

56

47120

1

50287

38

52903

17

MS21920-20

Purchased No

200 Each

103.0000

2

2



Clamp (per MIL-DTL-8783C)



*MA 10.08.16*

Location

Loc Qty

Loc Code

LG

103

112624

18

114687

35

114779

24

115057

26

MS27039-1-10

Purchased No

200 Each

133.0000

1

1



Screw



*MA 10.08.16*

Location

Loc Qty

Loc Code

ST291

133

112794

33

112940

100



**Dart Aerospace Ltd**

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Start Date: 7/23/2010

Required Date: 8/16/2010

Start Qty: 1.00

Required Qty: 1.00

AN4-41A

Purchased

No

220

Each

290.0000

8



Bolt

## Location

## Loc Qty

## Loc Code

ST360

290

111424

4

113359

86

~~114941~~

100

115108

100



8  
10/9/17-8/

AN4-6A

Purchased

No

220

Each

1,243.000

16



Bolt

## Location

## Loc Qty

## Loc Code

ST356

1243

112933

96

113149

344

114523

2

114615

1

~~114941~~

500

115108

300



16  
10/9/17 SP

AN5-32A

Purchased

No

220

Each

228.0000

4



Bolt

## Location

## Loc Qty

## Loc Code

ST40

228

113121

4

~~114056~~

74

114405

50

115016

50

115108

50



4  
10/9/17 SP

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Shop Packet Print

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Start Qty: 1.00

Required Qty: 1.00

AN960JD416 NAS1149D0463J Purchased No

220 Each

0.0000

32 32



Washer



M115622 10/9/17 SF

AN960JD516 NAS1149D0563J Purchased No

220 Each

0.0000

8 8



Washer



M114742 10/9/17 SF

D3500-1 Manufactured No

220 Each

42.0000

4 4



Saddle



10/9/17 SF

## Location

## Loc Qty

## Loc Code

ST424

26

59120

8

59422

18

ST425

16

55605

16

D3501-1 Manufactured No

220 Each

406.0000

16 16



Bushing



10/9/17 SF

## Location

## Loc Qty

## Loc Code

ST066

406

45402

15

45918

112

48268

179

53779

100

16

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Start Date: 7/23/2010

Required Date: 8/16/2010

Start Qty: 1.00

Required Qty: 1.00

MS21042L4

Purchased

No

220

Each

3,897.000

24

24



10/9/17 SP

Nut

## Location

## Loc Qty

## Loc Code

ST300

3897

113422

68

114523

28

114718

23

114784

1778

115108

2000

MS21042L5

Purchased

No

220

Each

796.0000

4



24  
10/9/17 SP

Nut

## Location

## Loc Qty

## Loc Code

ST139

296

114813

296

ST300

500

115156

500

4

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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

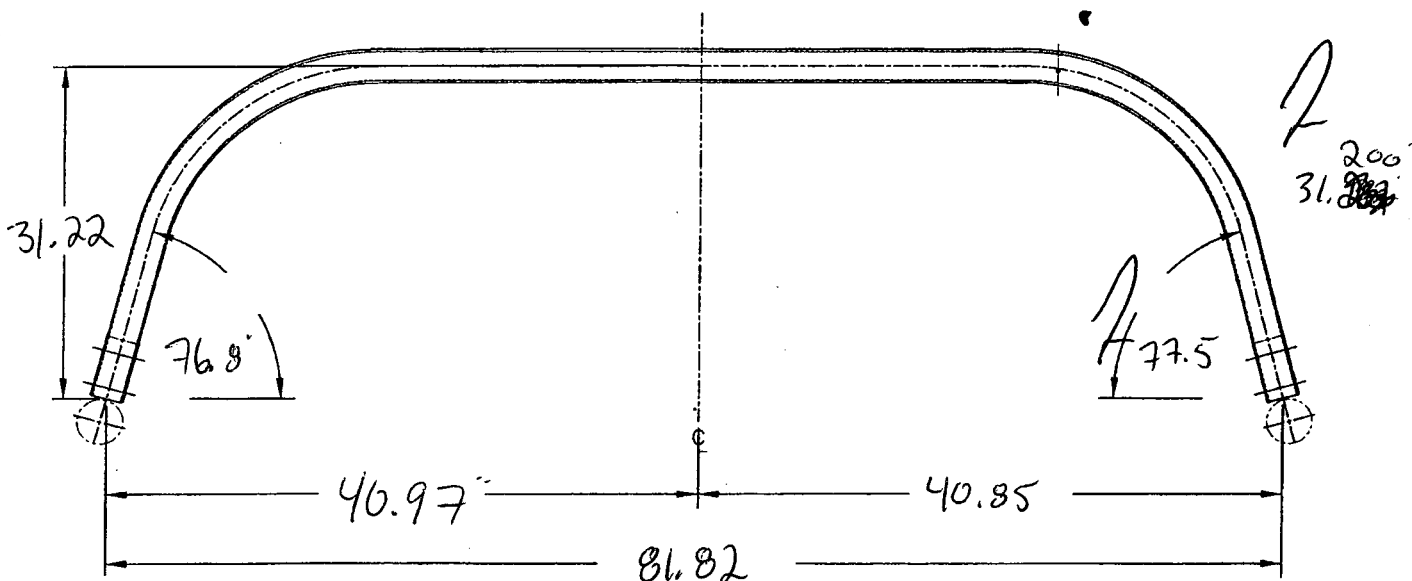
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

DART AEROSPACE LTD		Work Order:	60822
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: <i>DE</i>		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Q.171 ~ twist from 0° flat. <i>[Signature]</i>

QC15 Inspection	<i>[Signature]</i>
Date	10/06/18

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM <i>[Signature]</i>	<i>[Signature]</i>



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6018-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 40822  
2110-723

**RELEASED**  
2009-10-29  
*MD*

E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.02.31
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>q</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	<i>q</i>	DRAWING NO.	REV. E
MFG. APPR.	<i>DS</i>	D350-748-241	SHEET 1 OF 4
APPROVED	<i>MD</i>	TITLE	SCALE
DE APPR.	<i>H</i>	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE COPIED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

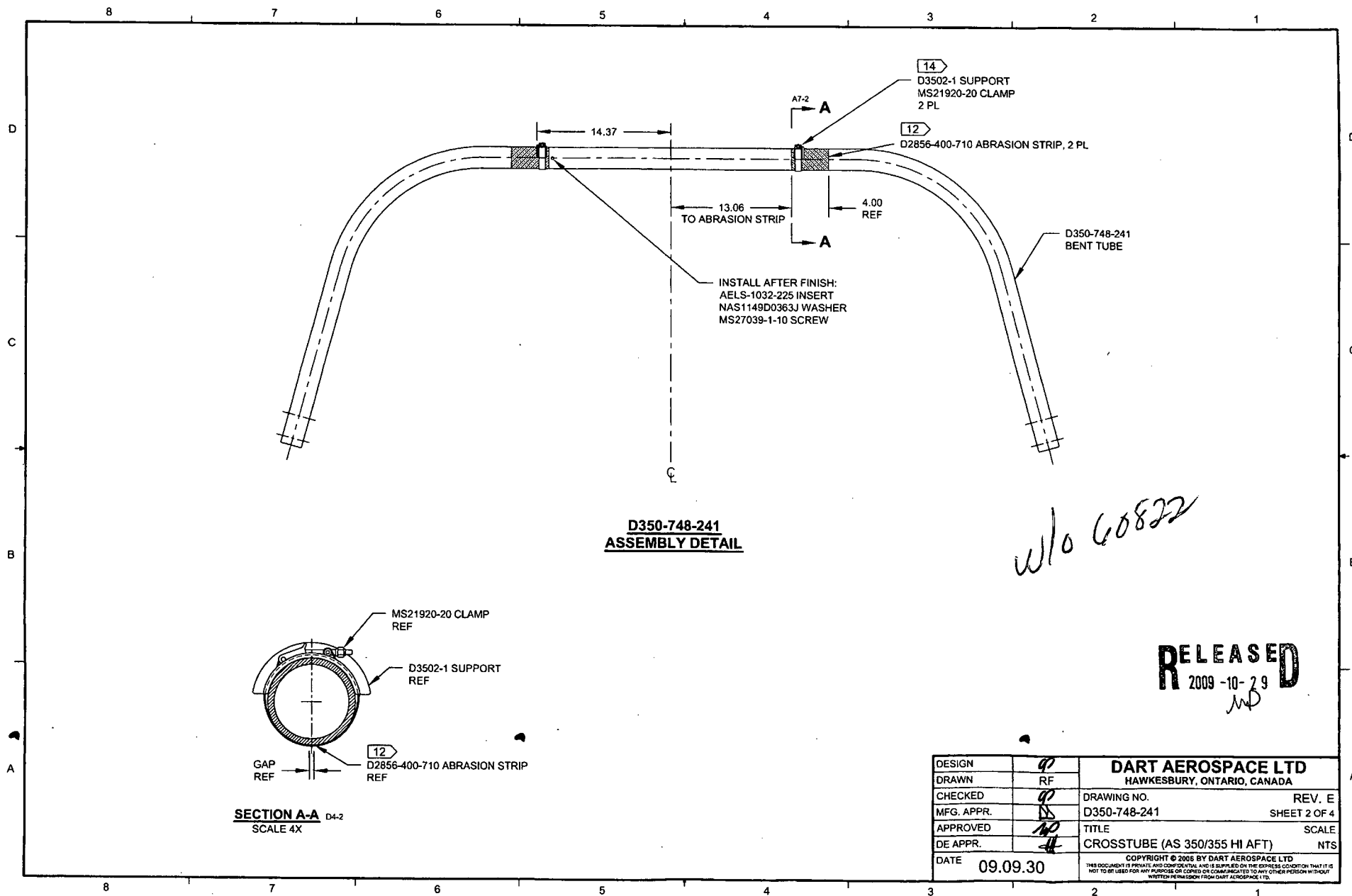
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval. QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



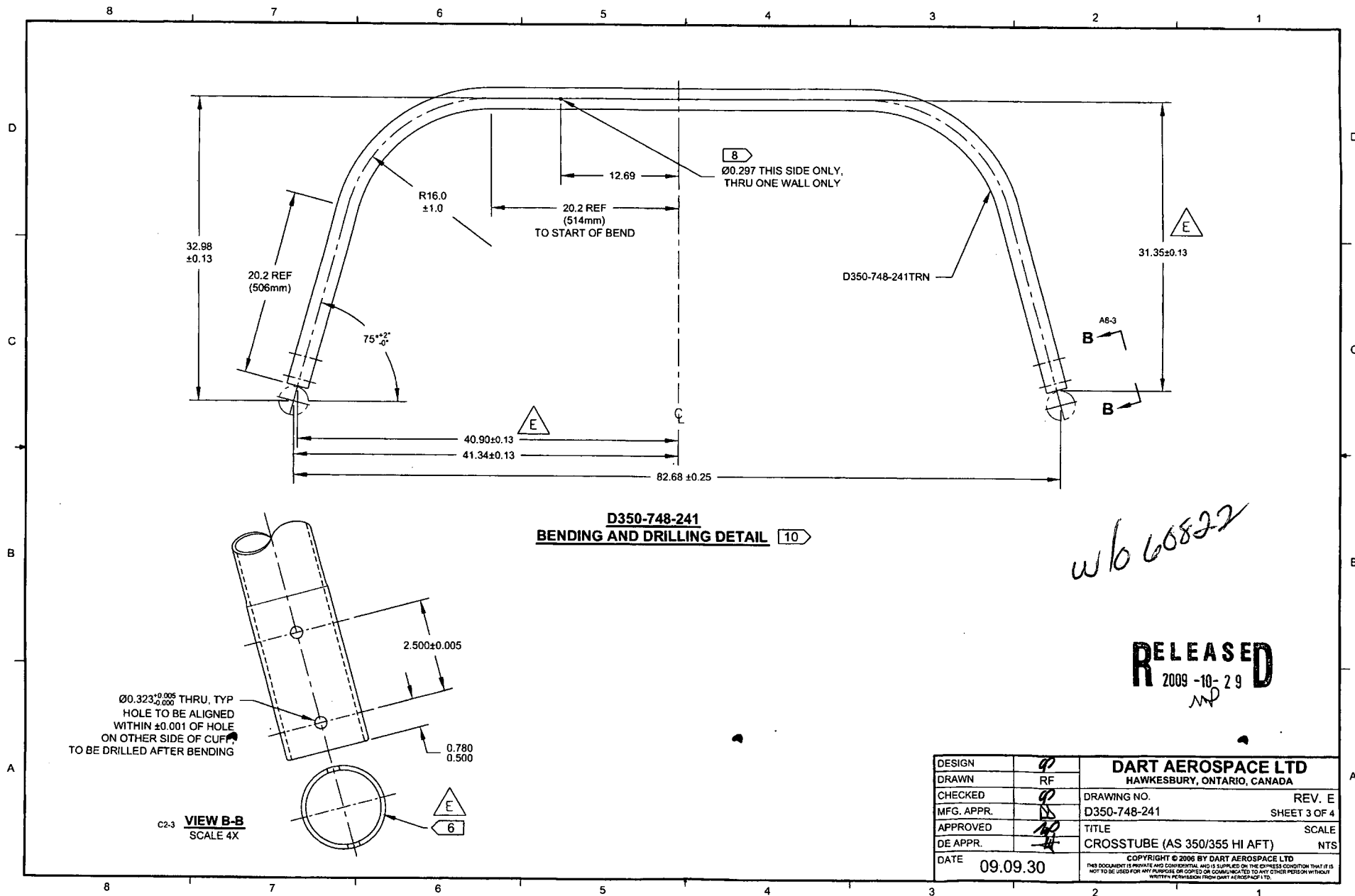
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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval. QC Inspector

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DESIGN	Q	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	NS	D350-748-241	SHEET 3 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
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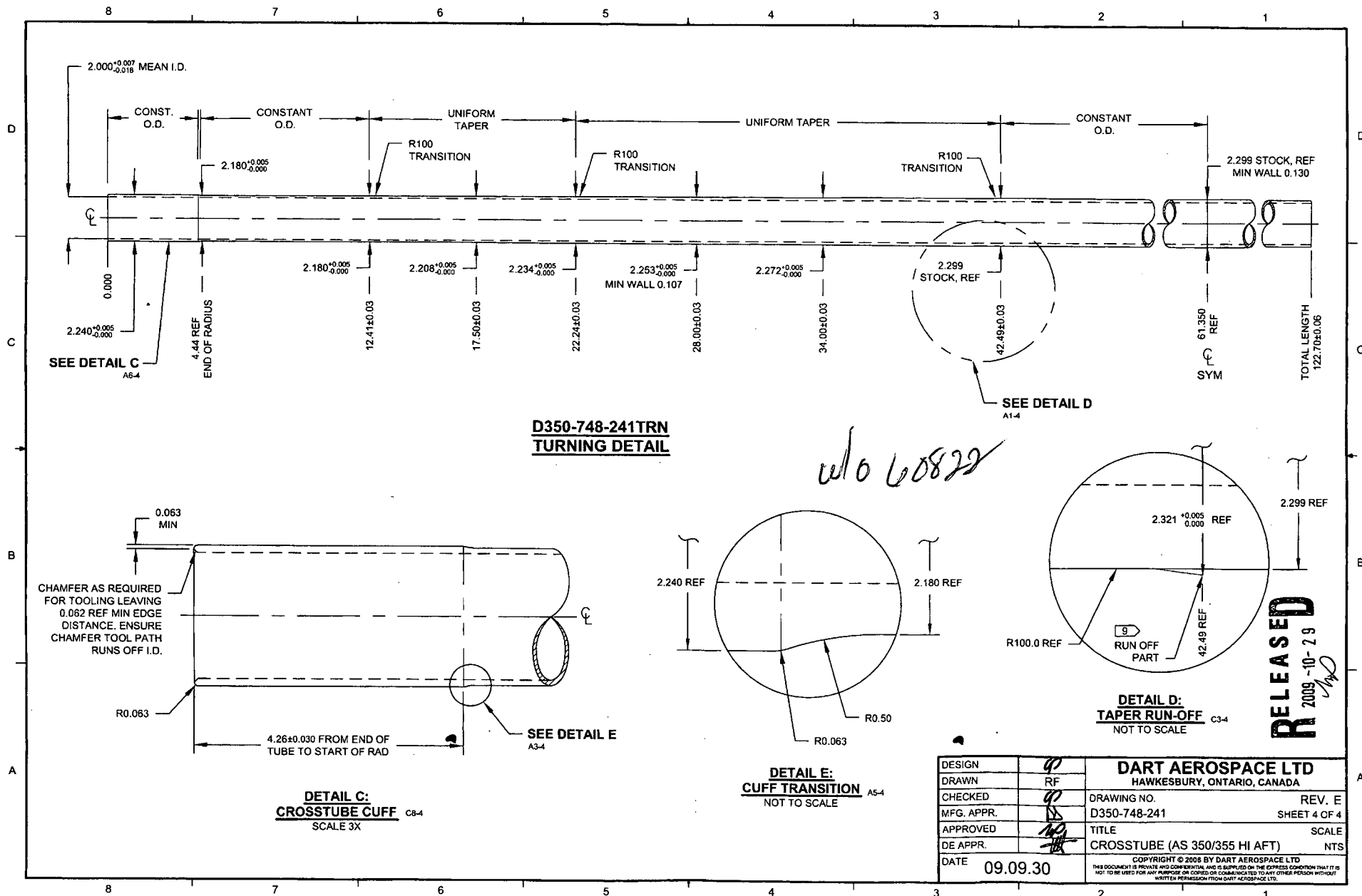
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**CERTIFICATE OF  
CONFORMANCE**

**CADORATH PLATING CO. LTD.  
2150 LOGAN AVENUE  
WINNIPEG, MANITOBA R2J-0J1**

**DATE: Sep-03-2010**

**CONIGNED TO: Dart Aerospace Ltd.  
1270 Aberdeen St.  
Hawksbury, ON K6A 1K7**

**W/O #: 97985**

**INVOICE #: 51085**

**CONTRACT OR  
PURCHASE ORDER # PO12435**

**DESCRIPTION: SKID**

**QTY 1**

**P/N # D350-748-201**

**S/N # B60822**

**STRESS REFLIF BAKE @ 375 DEG. BAKE HEAT CHART #10-907.  
MPI INSPECTED IAW ASTM-E-1444. CADMIUM PLATED IAW AMS-  
QQ-P-416C, TYPE 2 YELLOW, CLASS 1. BAKE HEAT CHART #10-923.**

**CERTIFICATE: I certify that the items indicated here on have  
been inspected and tested and conform to all specifications  
and requirements detailed on the contract or purchase order.**

**Approved Inspector:**



A large, stylized handwritten signature in black ink, written over a horizontal line.



# LIQUID PENETRANT TEST REPORT

P- 15189

CLIENT DART Aerospace DATE Sept 13-2010 PAGE 1 OF 1  
ATTENTION LINDA/CHANTEL ACUREN JOB No. 100-10-0838  
ADDRESS 1270 ADELPHI STREET. PO/WO No. 12345  
HAWKESBURY ON WORK LOCATION HAWKESBURY PLANT  
KOH 1KT ACCEPTANCE STD. ASTM 1417 REV./DATE 2007  
PROJECT F.P.I. on CROSS TUBES  
ITEM(S) EXAMINED 11

JOB DESCRIPTION WET FLOWESCENT LIQUID PENETRANT INSPECTION CARRIED OUT 100% EXTERNAL.  
PROCEDURE No. LT-0002 REV./DATE --- TECHNIQUE No. LT-0002 REV./DATE ---  
PART No. --- MATERIAL STEEL THICKNESS ---  
SCOPE WET FLOWESCENT LIQUID PENETRANT INSPECTION CARRIED OUT 100% EXTERNAL.

TEST DETAILS  
METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N 16459 ☐ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT 2LG7 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER H2O MINIMUM DRY TIME >10 MIN. OTHER LAB. NO.  
DEVELOPER SKD 52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N 1090866 CAL DUE DATE 06-7-10  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE  
SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- (☐ METRIC ☐ IMPERIAL)

1 - CROSS TUBE W.O. 59905	✓
1 - CROSS TUBE W.O. 60815	✓
1 - CROSS TUBE W.O. 59907	✓
1 - CROSS TUBE W.O. 60816	✓
1 - CROSS TUBE W.O. 59905	✓
1 - CROSS TUBE W.O. 60820	✓
1 - CROSS TUBE W.O. 60821	✓
1 - CROSS TUBE W.O. 60822	✓
1 - CROSS TUBE W.O. 60817	✓
1 - CROSS TUBE W.O. 60818	✓
1 - CROSS TUBE W.O. 59904	✓
1 - CROSS TUBE W.O. 59906	✓

- EXAMINATION WAS COMPLETED PRIOR TO DEFLECTION TESTING

10 08 15

Scope of Services  
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of that data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.  
Standard of Care  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES  
CLIENT REPRESENTATIVE Don Tittley SIGNATURE [Signature] DTR # EG3387  
TECHNICIAN (SIGNATURE): Mike Jettus  
NAME (PRINT): Mike Jettus 1<sup>ST</sup> TECHNICIAN  
CGSB LEVEL I SNT LEVEL --- CGSB LEVEL --- SNT LEVEL ---  
CGSB REG. NO. 6606 CGSB REG. NO. ---



## LIQUID PENETRANT TEST REPORT

P- 15191

CLIENT	<u>DART Aerospace</u>	DATE	<u>SEP 13-2010</u>	PAGE	<u>1</u> OF <u>1</u>
ATTENTION	<u>LINDA/CHANTEL</u>	ACUREN JOB NO.	<u>188-10-0838</u>	TIME	AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>
ADDRESS	<u>1270 ABERDEEN STREET</u>	PO/WO No.	<u>12345</u>		
	<u>HAWKESBURY, ON.</u>	WORK LOCATION	<u>HAWKESBURY PLANT.</u>		
	<u>KOH 1K7</u>	ACCEPTANCE STD.	<u>ASTM 1417</u>	REV./DATE	<u>2007</u>
PROJECT	<u>F.P.I.</u>		<u>ON</u>		
ITEM(S) EXAMINED			<u>CROSS TUBES</u>		
			<u>12</u>		

JOB DESCRIPTION	PROCEDURE No. <u>LT 0002</u>	REV./DATE	TECHNIQUE No. <u>LT 1417</u>	REV./DATE
PART NO.		MATERIAL	<u>STEEL</u>	THICKNESS
SCOPE	<u>WET FLOUORESCENT LIQUID PENETRANT</u>			
	<u>INSPECTION CARRIED OUT 100% EXTERNAL</u>			

TEST DETAILS	
METHOD	<input checked="" type="checkbox"/> FLUORESCENT <input type="checkbox"/> VISIBLE
FAMILY BRAND	<u>MAGNAFLUX</u>
PENETRANT	<u>2L07</u> MINIMUM DWELL TIME <u>45</u> MIN.
PENETRANT REMOVER	<u>H2O</u> MINIMUM DRY TIME <u>&gt;10</u> MIN.
DEVELOPER	<u>SKD 52</u> MINIMUM DWELL TIME <u>10</u> MIN.
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS <input type="checkbox"/> DRY
	<input checked="" type="checkbox"/> WATER WASH <input type="checkbox"/> SOLVENT REMOVABLE <input type="checkbox"/> POST EMULSIFIED
	BLACK LIGHT S/N <u>16459</u> <input type="checkbox"/> OUTPUT > 1000 $\mu$ W/cm <sup>2</sup> <input type="checkbox"/> AMBIENT < 2 fc
	LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT <input type="checkbox"/> OUTPUT > 100 fc @ SURFACE
	OTHER <u>LABINO</u>
	LIGHT METER S/N <u>1098866</u> CAL DUE DATE <u>OCT 19 2010</u>

TEST SURFACE	
SURFACE CONDITION	<input type="checkbox"/> AS GROUND <input type="checkbox"/> AS WELDED <input checked="" type="checkbox"/> MACHINED <input type="checkbox"/> SHOT BLASTED <input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/ 20°F <input type="checkbox"/> -4°C/ 20°F TO 10°C/50°F <input type="checkbox"/> 10°C/50°F TO 52°C/125°F <input type="checkbox"/> > 52°C/125°F

RESULTS- ( <input type="checkbox"/> METRIC <input type="checkbox"/> IMPERIAL )	
<u>1 - CROSS TUBE W.O. 59905 ✓</u>	<u>- EXAMINATION WAS COMPLETED</u>
<u>1 - CROSS TUBE W.O. 60815 ✓</u>	
<u>1 - CROSS TUBE W.O. 59907 ✓</u>	
<u>1 - CROSS TUBE W.O. 60816 ✓</u>	
<u>1 - CROSS TUBE W.O. 60820 ✓</u>	
<u>1 - CROSS TUBE W.O. 60821 ✓</u>	
<u>1 - CROSS TUBE W.O. 60822 ✓</u>	
<u>1 - CROSS TUBE W.O. 60817 ✓</u>	
<u>1 - CROSS TUBE W.O. 60818 ✓</u>	
<u>1 - CROSS TUBE W.O. 59904 ✓</u>	
<u>1 - CROSS TUBE W.O. 59906 ✓</u>	<u>* AFTER DEFLECTION TESTING</u>
	<u>M/ 10 09 15</u>

**Scope of Services**  
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

**Standard of Care**  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES		DTR # <u>E63387</u>
CLIENT REPRESENTATIVE	<u>[Signature]</u>	REPORT REVIEWED BY:
TECHNICIAN (SIGNATURE):	<u>[Signature]</u>	NAME INITIALS
NAME (PRINT):	<u>Mike Johnston</u>	
CGSB LEVEL	<u>1<sup>st</sup></u> SNT LEVEL	CGSB LEVEL
CGSB REG. No	<u>6606</u>	CGSB REG. No

## 5.0 PARTS LIST

Qty -101	Qty -201	Part Number	Description
X		D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X	D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
1		D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1	D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
*2	*2	D3502-1	SUPPORT
*2	*2	D2856-400-710	ABRASION STRIP
*1	*1	AELS-1032-225	INSERT
*2	*2	MS21920-20	CLAMP
*1	*1	MS27039-1-10	SCREW
*1	*1	AN960JD10	WASHER
4	4	D3500-1	SADDLE
16	16	D3501-1	BUSHING
16	16	AN4-6A	BOLT
8	8	AN4-41A	BOLT
4	4	AN5-32A	BOLT
32	32	AN960JD416	WASHER
8	8	AN960JD516	WASHER
24	24	MS21042L4	NUT (OR MS21042-4)
4	4	MS21042L5	NUT (OR MS21042-5)

\* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/241 ASSEMBLIES ABOVE

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Revision: **B**

Date: 07.06.15